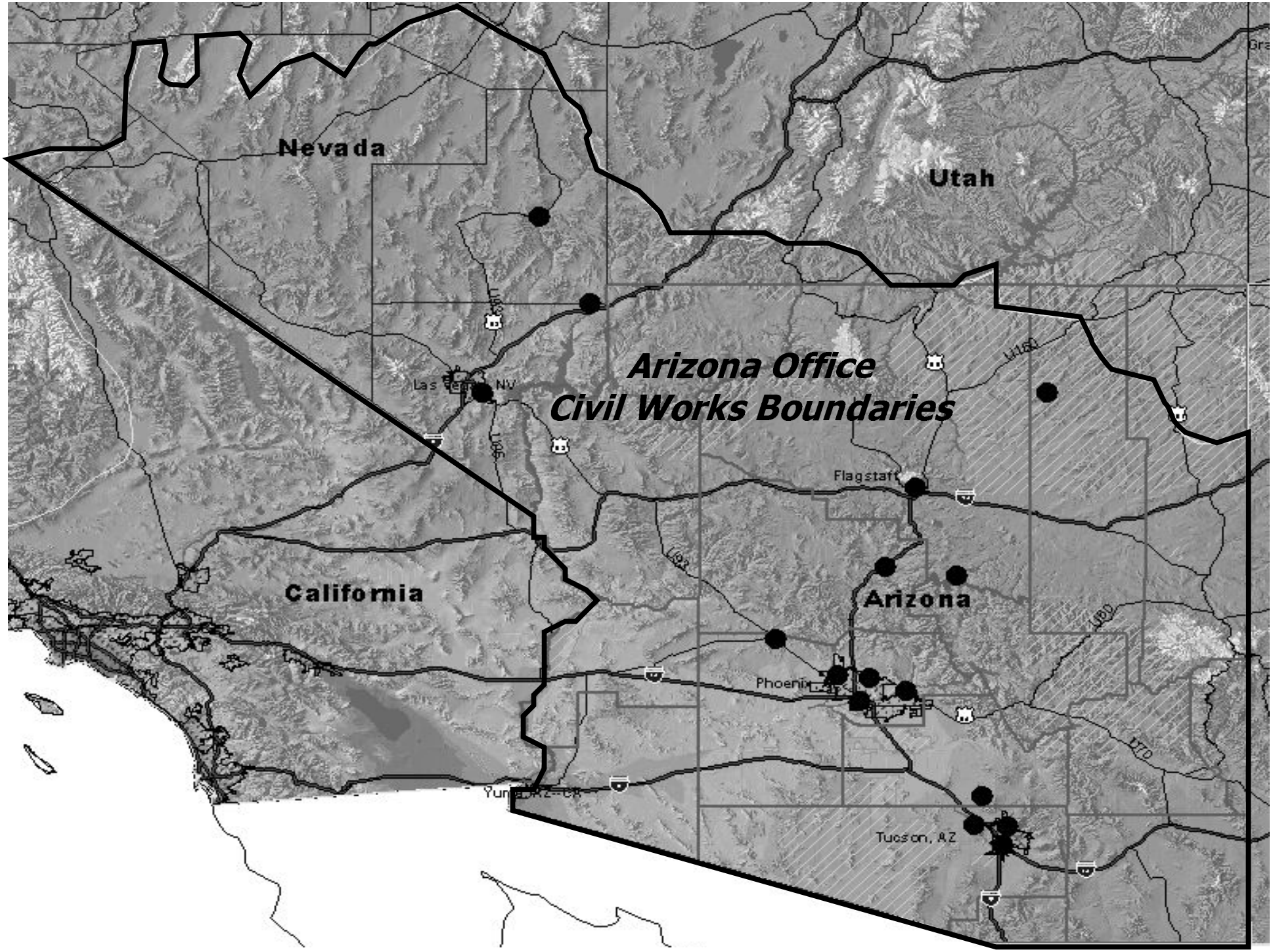
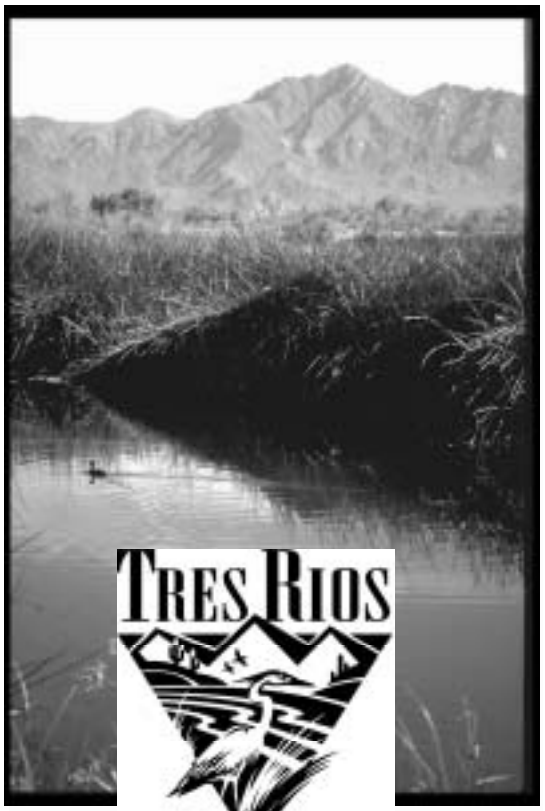
Case Study: Ecosystem Restoration in Arizona, Application of HGM

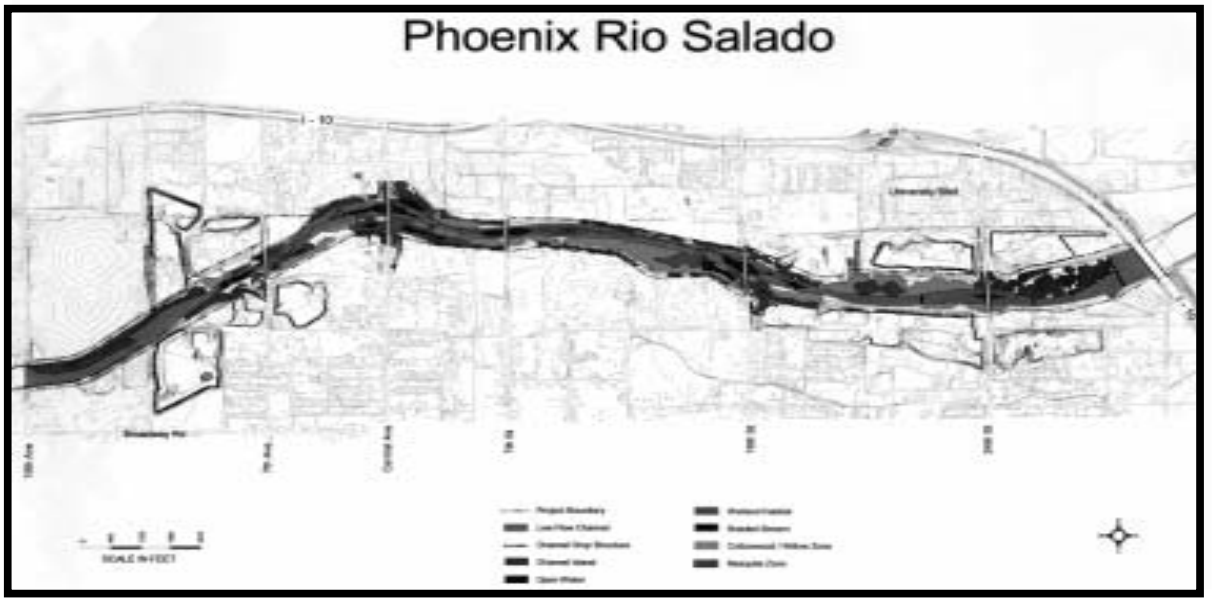
Kelly A. Burks-Copes (ERDC-EL-MS)

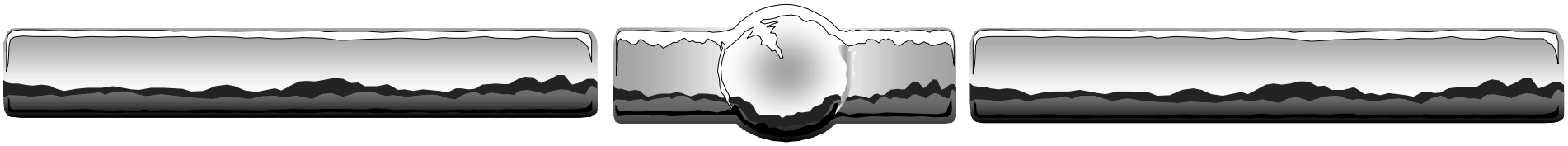
Scott K. Estergard (CESPL-PD-WC)


Nevada
Utah
Arizona Office
Civil Works Boundaries
Las Vegas
NV
Flagstaff
California
Arizona
Phoenix
Tucson, AZ

Authorized Projects



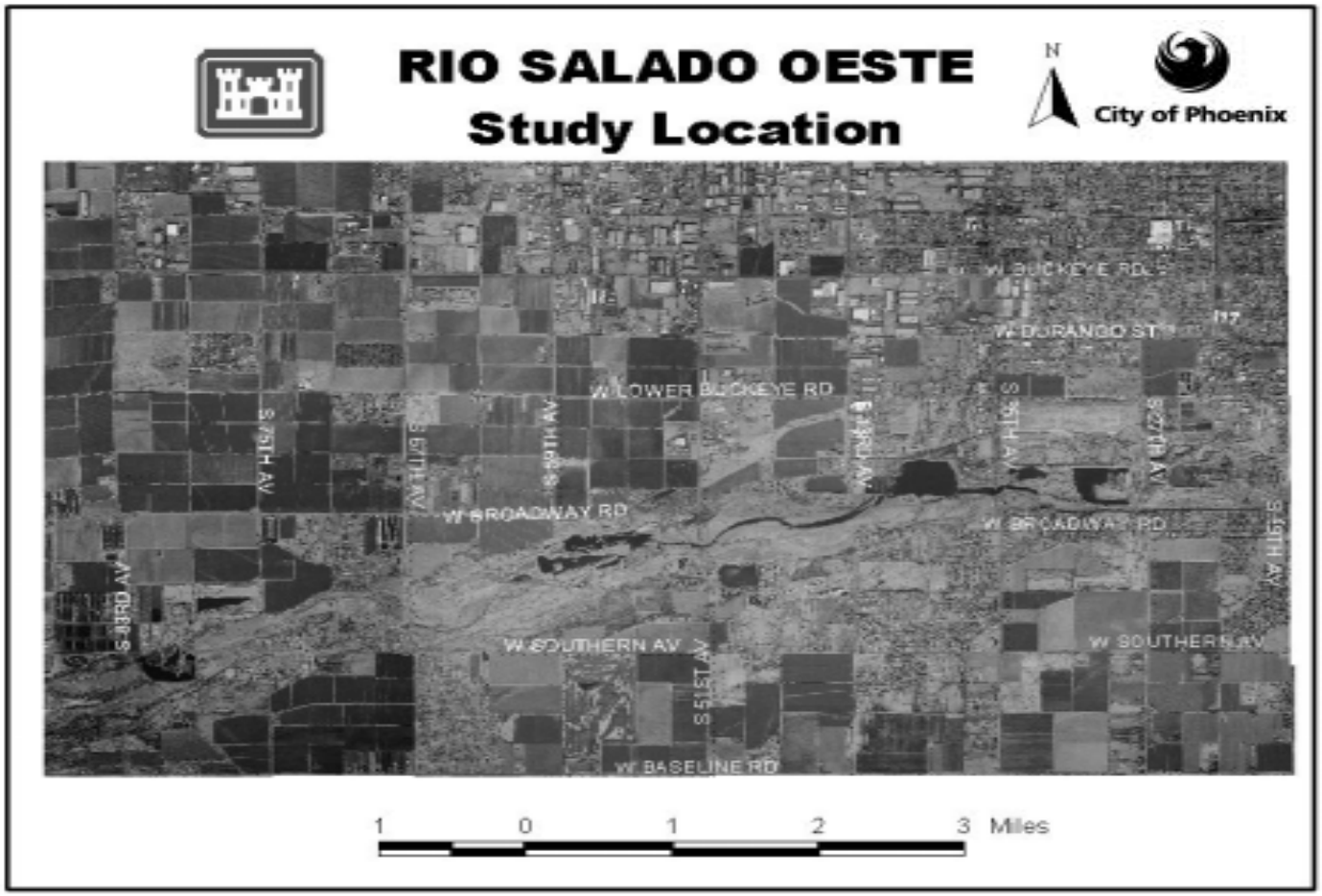




Civil Works Program

GI Study	*Location*
Paseo de las Iglesias	Santa Cruz River, Pima County
Va Shly ‘ay Akimel	Salt River, Maricopa County
Tres Rios del Norte	Santa Cruz River, Pima County
Rio Salado Oeste	Salt River, Maricopa County
El Rio Antiguo	Rillito River, Pima County

Study Location

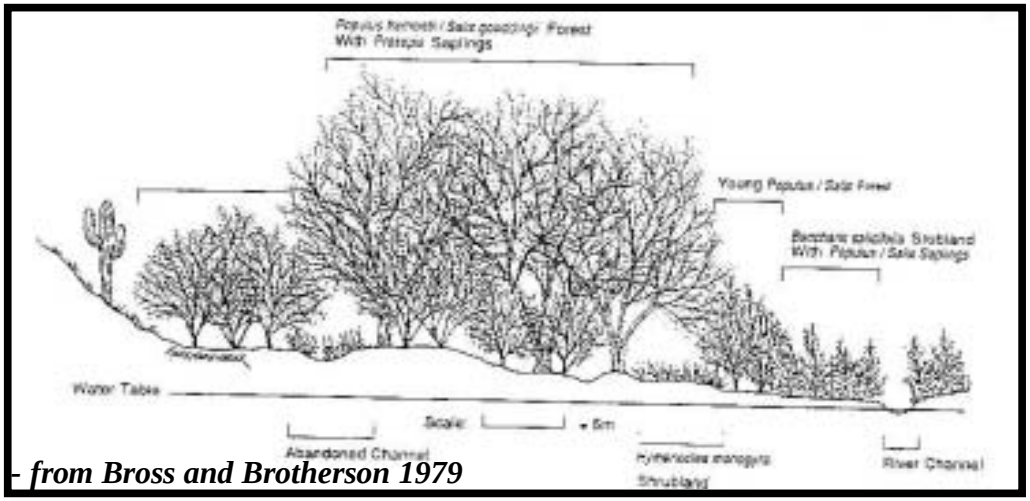


Historic Conditions

- Perennial stream prior to dam construction
- Meandering channel including sandbars and backwaters.
- Sonoran desert riparian habitat included cottonwood, willow and mesquite forests in the floodplain.

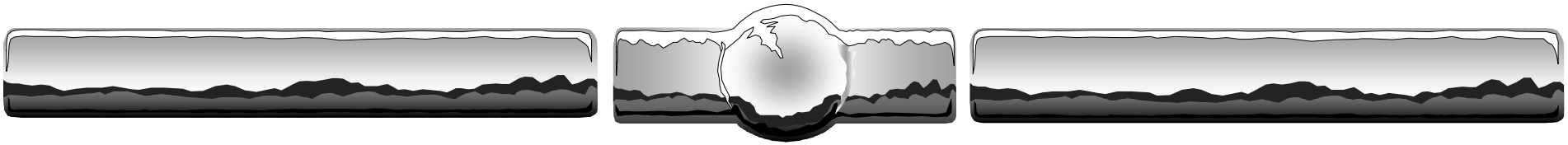
Current Conditions

Project Goals



- from Bross and Brotherson 1979

- Restore native riparian and wetland habitat, and adjacent vegetation communities.
- Increase passive recreational and environmental education opportunities.
- Reduce flood damages to structures and infrastructure.



Preliminary Restoration Measures

•**Develop Water Supply**: A water supply and distribution system will be required in order to return some form of surface (base flow) and groundwater hydrology to the river.

•**Create Mesquite Bosque**: Mesquite trees could be established on terraces and over-bank areas.

•**Cottonwood/Willow Gallery**: Plant and establish cottonwood and willow tree plant communities along the wetted perimeter, fringe area locations within the river.

•**Wetlands Creation**: Wetlands would be established at appropriate locations.

•**Incorporate Existing Ponds**: Utilize existing open water area, created by abandoned gravel mining operations, to create habitat and recreation areas.

•**Create Base Flow**: This feature may return the conditions of a perennial environment to the study area.

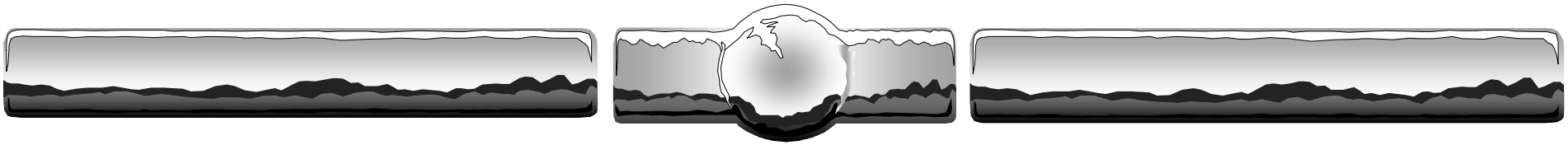
•**Vector Control**: Incorporate mosquito control measures as an integral part of the selected plan design and maintenance.

•**Clean-Up**: Clean-up debris and reshape the bank and channel, where manmade changes have occurred.

•**Levee/Channel**: Evaluate flood control levees and/or channel improvements to improve conveyance capacity at flood problem locations.

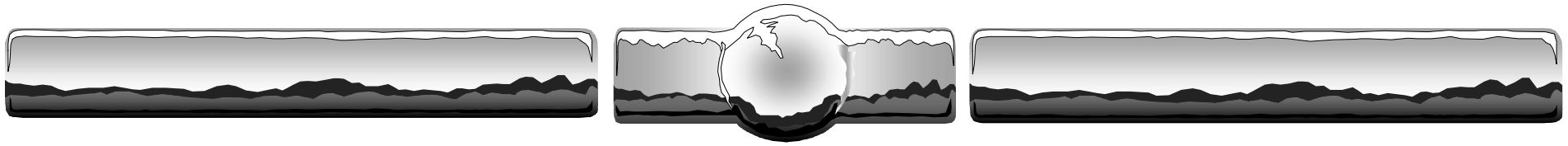
•**Recreational Corridor**: Incorporate trails and other passive recreational features in support of the other restoration management measures.

•**Cultural Mitigation**: Incorporate cultural resources mitigation features, if required.



Potential Restoration Measures

- Develop Water Supply
- Create Mesquite Bosque
- Cottonwood/Willow Gallery
- Wetlands Creation
- Incorporate Existing Ponds
- Create Base Flow
- Vector Control
- Clean-Up
- Levee/Channel
- Recreational Corridor
- Cultural Mitigation



What method should be used to measure the success of a restoration project?

HEP

AREM

FQA

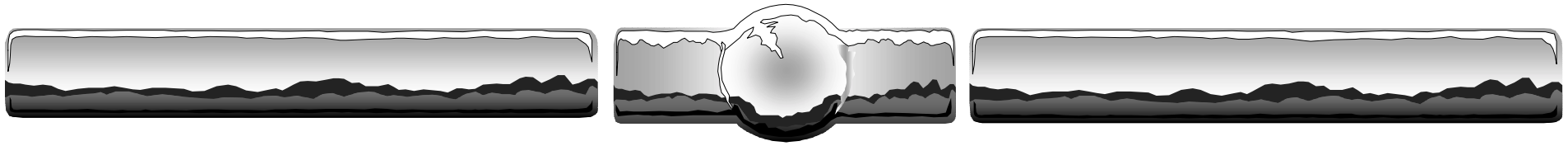
Tree #

IBI

Bird Pops

HGM

WRAP



What tools can be used to measure the success of a restoration project?

Databases

Models

Checklists

Indices

Classification Systems

Matrices

Maps

Software

What is HGM?

- Functional Accounting System
- Currency = Functional Capacity Units (FCU's)

Quantification In HGM

$$FCI = \frac{\text{Study Area Conditions}}{\text{Reference Standard Wetland}}$$

Score = 0.0 to 1.0

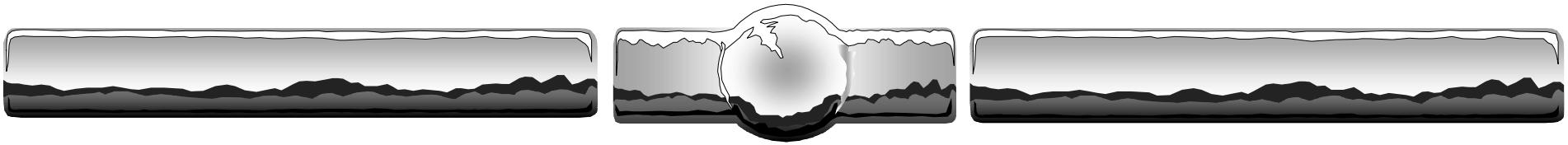
FCU = Quality X Quantity

Arizona Applicable Model ?

- Brinson, et al., 1995
- Review of Existing HGM Guidebooks

Model Development Conference

- State & Federal Agencies
- Sponsors
- Academia
- Corps staff



Riverine Wetland and Riparian Functions

Hydrologic

- Maintenance of Characteristic Channel Dynamics
- Dynamic Surface Water Storage and Energy Dissipation
- Long Term Surface Water Storage
- Dynamic Subsurface Water Storage

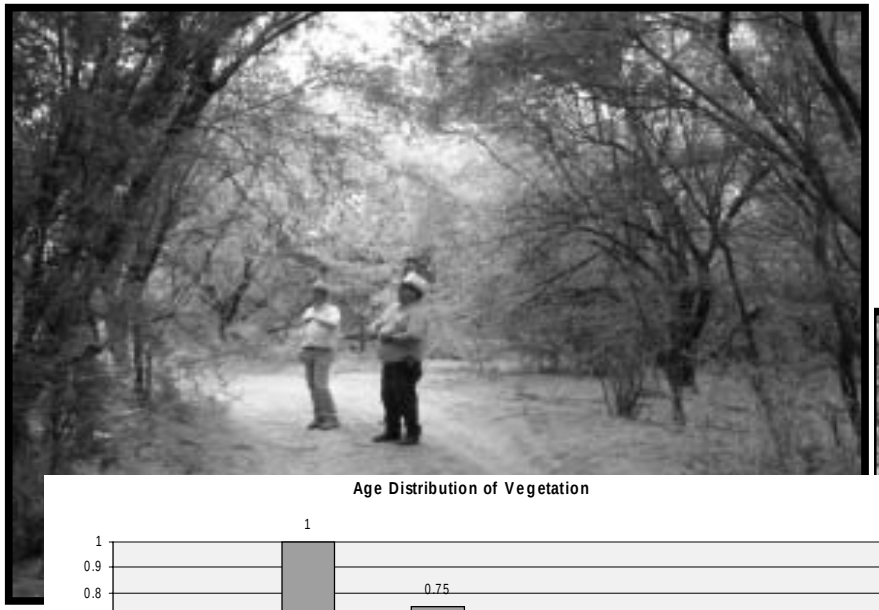
Biogeochemical

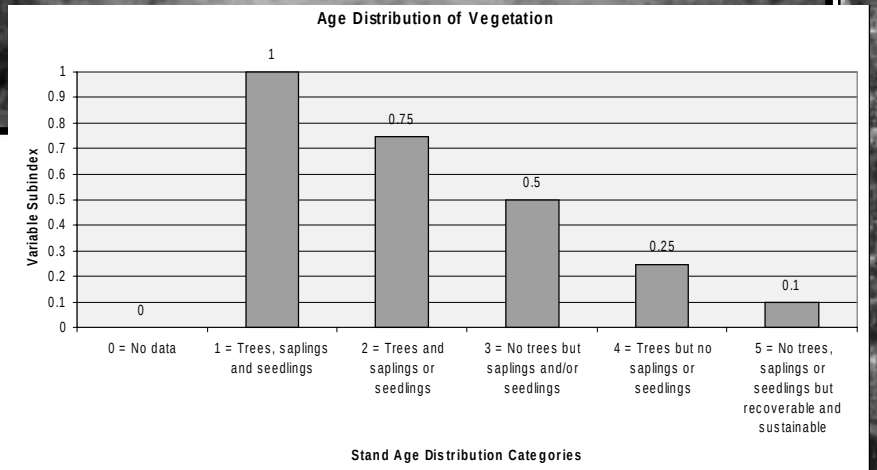
- Nutrient Cycling
- Removal and/or Detention of Imported Elements
- Detention of Particulates

Habitat

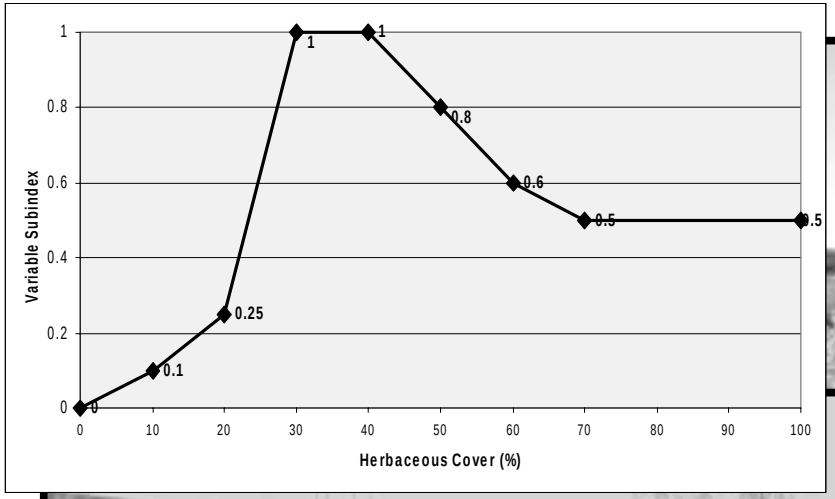
- Maintain Characteristic Plant Community
- Maintain Spatial Structure of Habitat
- Maintain Interspersion and Connectivity
- Maintain Protection Zone from Urban Encroachment

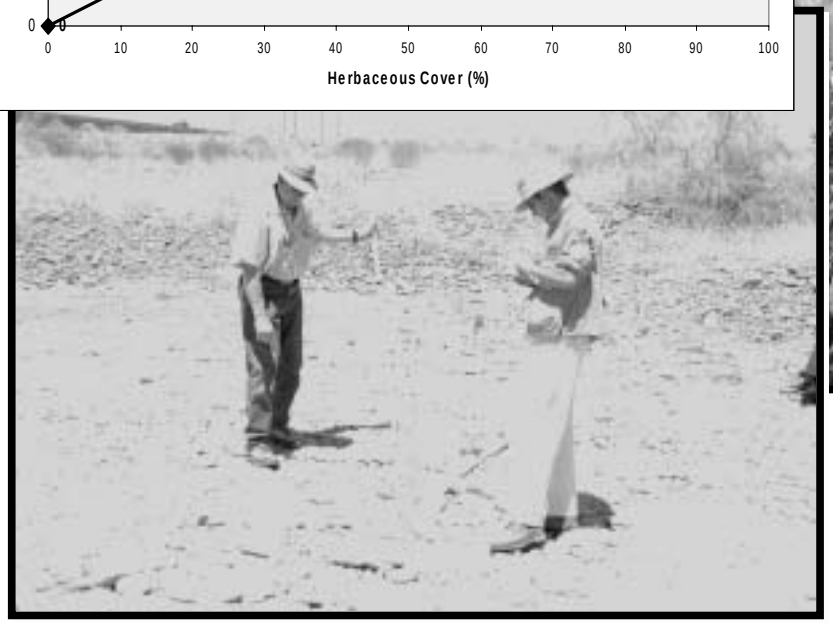
Reference Site Sampling





Study Area Sampling

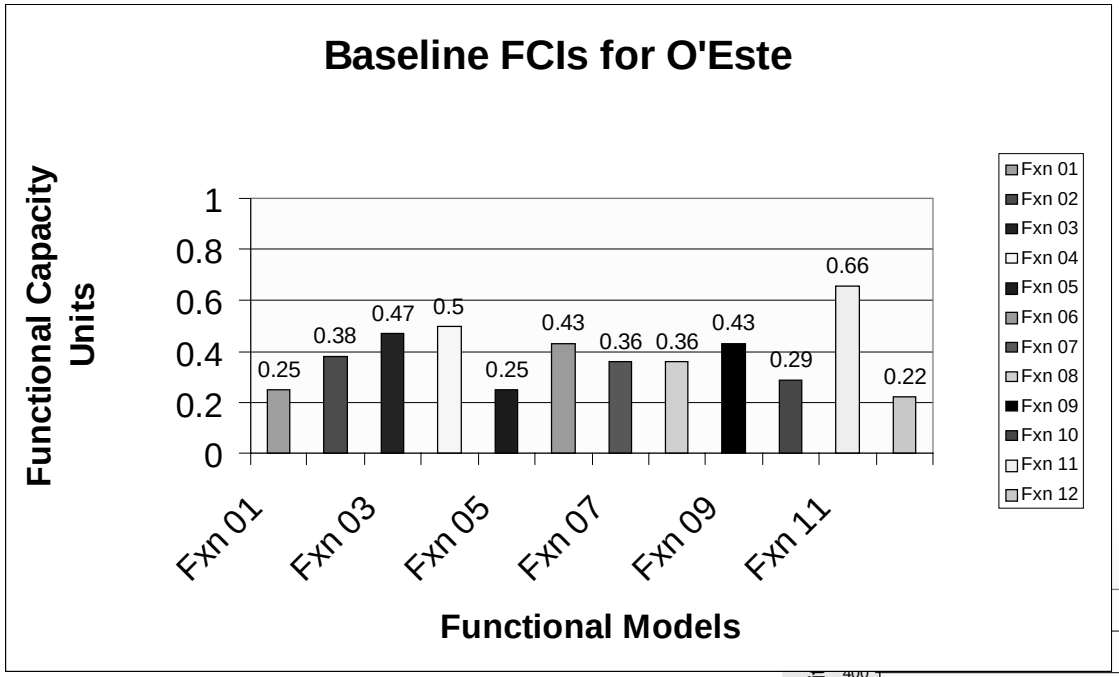


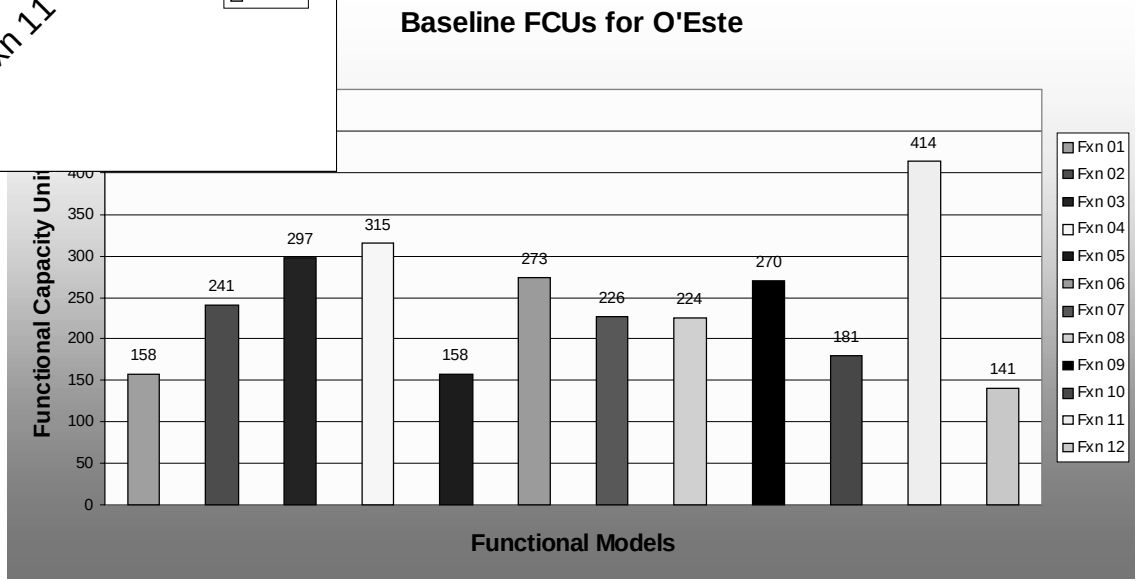


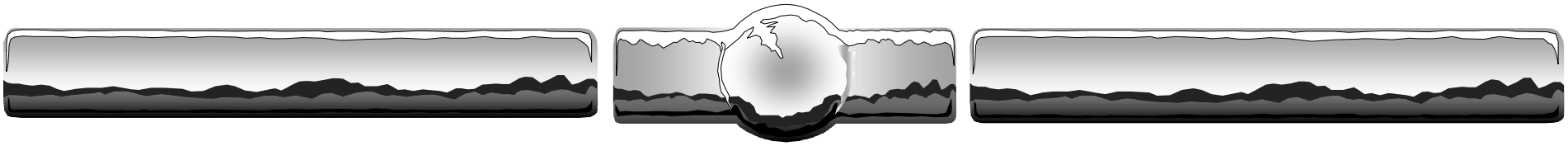
EXHGM Software

- Quantifies conditions using standard HGM techniques
- Incorporates a broad range of HGM regional guidebooks
- Processes large amounts of data quickly and efficiently
- Reduces computation time
- Adapts to regional variation
- Accommodates a variety of data formats

Preliminary Baseline Results



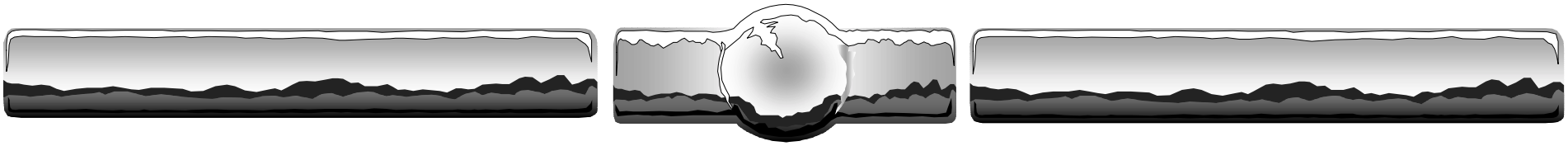




Current Status

- ✓Build An Interagency Team
- ✓Define Project
- ✓Develop Goals & Objectives
- ✓Define Project Life & Target Years
- ✓Delineate Cover Types (PWAAs)
- ✓Select & Modify Model(s)
- ✓Gather Field Data

- Evaluate
  - Existing Condition
  - Without Project Conditions
  - With Project Conditions
- Compare Alternative Plans
  - Trade-offs
  - Incremental Cost Analysis
- Select Recommended Plan
- Report Results and Decisions



Conclusion

- Project on-going
- EXHGM Analysis – Jan 03
- Alternatives Formulation Briefing – FY03
- Feasibility Complete by WRDA04